



## *Antarctic Meteorite NEWSLETTER*

A periodical issued by the Antarctic Meteorite Working Group to inform scientists of the basic characteristics of specimens recovered in the Antarctic.

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The Meteorite Working Group will meet next in mid-September, 1979, to consider sample requests for specimens described in the newsletters. Please submit requests to:

John O. Annexstad  
Secretary, Meteorite Working Group  
Curators Branch, Code SN2  
NASA/Johnson Space Center  
Houston, Texas 77058

Detailed procedures and requirements for sample requests can be found in previous Newsletters.

## ANTARCTIC METEORITE DATA SHEET

Sample No. ALHA78006 Location: Allan Hills  
Field No. 277  
Weight (gms) 8.0  
Meteorite Type Howardite

### Physical Description:

This is a nearly complete specimen (3.0 x 1.5 x 2.0 cm). Shiny black fusion crust covers all of the stone with the exception of portions of the E, W and S surfaces. Where the sample is void of fusion crust, light to dark gray interior material is exposed. A non-weathered brecciated surface with no metal exposed was revealed upon cleaving this stone in half.

### Petrographic Description: Brian Mason

The thin section shows a complex breccia of angular fragments (grains up to 1 mm long) of pyroxene (orthopyroxene and pigeonite) and plagioclase, with numerous poly-mineralic enclaves, set in a matrix of comminuted pyroxene and plagioclase. Accessory chromite and ilmenite and trace amounts of troilite and nickel-iron are present. The enclaves are holocrystalline pyroxene-plagioclase aggregates, and vary considerably in texture from coarse-grained gabbroic to fine-grained basaltic types. Slight weathering is indicated by small areas of rusty staining, usually in association with metal grains. Microprobe analyses show a wide range in pyroxene composition:  $Wo_{2-12}En_{31-72}Fs_{25-61}$ ; a number of grains with uniform composition  $Wo_3En_{11}Fs_{26}$  suggests the presence of a diogenitic component. Plagioclase averages  $An_{91}$ . A single grain of iron-rich olivine ( $Fa_{81}$ ) was analyzed. The meteorite is classified as a polymict pyroxene-plagioclase achondrite (howardite).

## ANTARCTIC METEORITE DATA SHEET

Sample No.	ALHA78019	Location:	Allan Hills
Field No.	274		
Weight (gms)	30.3		
Meteorite Type	Ureilite		

### Physical Description:

Fusion crust is present on all surfaces but is patchy and does not cover the entire stone. The fusion crust is smooth, dull brownish black and has polygonal fracture. Where the fusion crust is not present the surface is reddish-brown and crystalline. One fracture penetrated the entire stone.

### Other Characteristics:

The stone (3.0 x 2.5 x 3.0 cm) was cleaved in half and no unweathered material was exposed. The entire sample is reddish-brown throughout. The interior is crystalline which breaks apart when handled.

### Petrographic Description:     Brian Mason

The thin section shows an aggregate of rounded to subhedral grains (0.5 - 3 mm across, of olivine, with minor pyroxene. The grains are rimmed with black carbonaceous material. Trace amounts of troilite and nickel-iron are present, the latter largely altered to translucent brown limonite concentrated along grain boundaries. Microprobe analyses show olivine of uniform composition (Fa<sub>22</sub>) with notably high CaO (0.4%) and Cr<sub>2</sub>O<sub>3</sub> (0.7%) contents; the pyroxene is a pigeonite of composition Wo<sub>10</sub>Fs<sub>18</sub>En<sub>72</sub>. This meteorite is a ureilite, with mineral compositions essentially identical to those in the Kenna ureilite (Geochim. Cosmochim. Acta, 40, p. 1430, 1976); it appears to be relatively unshocked compared to most ureilites.

## ANTARCTIC METEORITE DATA SHEET

Sample No.	ALHA78040	Location:	Allan Hills
Field No.	284		
Weight (gms)	211.7		
Meteorite Type	Eucrite		

### Physical Description:

Snow and ice were present on the sample when it was removed from cold storage. This is a complete unweathered specimen ( $\sim 9.0 \times 5.0 \times 3.0$  cm). Black, shiny fusion crust  $\sim 0.5$  mm thick covers all the surfaces of the stone. The crust has been removed from the edges by spallation and has been preferentially weathered away on the surfaces in small circular areas. The B and T surfaces have had the most fusion crust removed, thus revealing light to medium gray matrix material that contains small ( $< 1$  mm) elongated white grains, probably feldspar. The T and S surfaces each have a 1.0 cm clast present. These clasts have a slightly lighter color than the surrounding fusion crust. On the N surface an oval vug is present. Inside this vug is a weathered yellowish-brown inclusion  $\sim 0.5$  cm diameter that has a coarser texture than the surrounding matrix material.

### Other Characteristics:

Cleaving this stone revealed a non-weathered surface with small (1-2 mm) dark gray minerals in the matrix material.

### Petrographic Description: Brian Mason

The thin section shows a complex breccia of angular fragments, up to 1 mm long, of pyroxene (mostly pigeonite) and plagioclase, with numerous enclaves (the largest 3 mm across), in a matrix of comminuted pyroxene and plagioclase. The enclaves consist of pyroxene and plagioclase and range in texture from doleritic to gabbroic. Accessory chromite and ilmenite and trace amounts of troilite and nickel-iron are present. No evidence of weathering was seen. Fusion crust rims part of the section. Microprobe analyses show pigeonite ranging in composition from  $Wo_6Fs_{33}En_{61}$  to  $Wo_7Fs_{52}En_{41}$ ; a few grains of ferroaugite, averaging  $Wo_{33}Fs_{40}En_{27}$ , were analysed. Plagioclase ranges in composition from  $An_{80}$  to  $An_{94}$ , with an average of  $An_{86}$ . The meteorite is classified as a eucrite (monomict pyroxene-plagioclase achondrite), but examination of a larger amount of material is desirable to confirm that the meteorite is truly monomict.

# ANTARCTIC METEORITE DATA SHEET

Sample No. ALHA78113 Location: Allan Hills  
Field No. 385  
Weight (gms) 298.6  
Meteorite Type Aubrite

## Physical Description: Brian Mason

This specimen is brecciated. Visible on the exterior surfaces are abundant very large enstatite grains (~2.5 x 2.0 cm) and less numerous dark clasts. Patches of very thin black fusion crust are present on only three of the six surfaces. Half of the B surface has thin yellowish-green weathering discoloration. Very small spots (<1 mm) of iron oxidation are present on 3 surfaces. Overall dimensions of this sample are 8.5 x 6.5 x 3 cm.

## Other Characteristics:

The cut face shows many large white enstatite clasts. Few of these contain isolated rounded blebs of metal, of which some have oxidation haloes around. Surrounding these white clasts is fine grained dark gray material. In places this material appears as veins, while in other areas it is much larger in diameter.

## Petrographic Description: Brian Mason

The thin section consists almost entirely of clasts of orthopyroxene up to 2 mm long in a groundmass of comminuted pyroxene. Accessory amounts of sulfides and nickel-iron are present as small grains in the groundmass. The section shows a moderate amount of brown limonitic staining, concentrated around the metal grains. Microprobe analyses show that the pyroxene is an iron-free enstatite ( $\text{FeO} < 0.1\%$ ) with minor and variable amounts of CaO (0.2 - 0.6, average 0.5%). The meteorite is an aubrite (enstatite achondrite).

## ANTARCTIC METEORITE DATA SHEET

Sample No. ALHA78132 Location: Allan Hills  
Field No. 406  
Weight (gms) 656.0  
Meteorite Type Eucrite or Howardite

### Physical Description:

Snow/Ice was present on the sample when it was removed from cold storage. This appears to be a complete specimen (11 x 10 x 8 cm) with vitreous black fusion crust on all sides. The overall shape is pyramidal with the B surface being flat. The fusion crust on the T surface has flow bands, most prominent in the N-S direction and less prominent in the W-E direction. The B surface has radial flow lines in area that is concave. The fusion crust on the S surface is much duller than on the rest of the stone. The crust has been spalled or chipped in some areas, revealing a medium gray interior material. Small (<1 mm) inclusions, both lighter and darker than the matrix are apparent. Several holes (voids) that penetrate the fusion crust by as much as ~1 cm were noted over the entire stone. One in particular is ~9 mm in diameter and ~1 cm deep and contains a yellowish grain (?) ~2 mm long.

### Other Characteristics:

The cut face shows a light gray matrix dotted with rounded and irregular shaped grains (?) that are both lighter and darker than the matrix. The largest grain is ~.5 cm in diameter. The voids that are present on the exterior of this specimen did not appear in the interior. A vein (?) of white grains extends for 6 cm across the cut face in the W-E direction.

### Petrographic Description: Brian Mason

The thin section shows a complex breccia of angular fragments (up to 1 mm across) of pyroxene (mostly pigeonite) and plagioclase, with numerous enclaves, in a matrix of comminuted pyroxene and plagioclase with accessory chromite and ilmenite. Most enclaves are ophitic to subophitic intergrowths of plagioclase and pyroxene, but one large elliptical one, 6 mm long, consists largely of pyroxene clasts. Microprobe analyses show pigeonite (with some augite exsolution lamellae) ranging in composition ( $Wo_{7-15}Fs_{40-68}$ ), and plagioclase  $An_{78-91}$ , average  $An_{88}$ ; the pyroxene in the pyroxene enclave has composition  $Wo_6Fs_{32}En_{62}$ , and appears to be an inverted pigeonite. The meteorite is a pyroxene-plagioclase achondrite; its classification as a eucrite or a howardite depends upon whether or not the pyroxene enclave is a cognate inclusion.

# ANTARCTIC METEORITE DATA SHEET

Sample No. ALHA78158 Location: Allan Hills  
Field No. 362  
Weight (gms) 15.1  
Meteorite Type Eucrite or howardite

## Physical Description: Brian Mason

This is not a complete specimen. Fusion crust which is shiny black, is present on one surface. All other surfaces are fracture surfaces which show a medium gray matrix with white flecks. Some clasts (<1 mm) are oxidized to a yellow color. An area ~.5 cm diameter on the B surface is a darker gray and appears very homogeneous -- this appears to be a rounded clast. One fracture goes completely across the sample. Overall dimensions are 3.0 x 2.5 x 2 cm.

## Other Characteristics:

This meteorite looks very similar in appearance to ALHA78165.

## Petrographic Description:

The polished thin section of this meteorite is identical in all respects with that of ALHA78132 (except for the pyroxene xenolith in ALHA78132). Microprobe analyses show similar composition for both pyroxene and plagioclase. In the absence of evidence to the contrary it appears that ALHA78158 and ALHA78132 are probably pieces of a single meteorite.

## ANTARCTIC METEORITE DATA SHEET

Sample No. ALHA78165 Location: Allan Hills  
Field No. 370  
Weight (gms) 20.9  
Meteorite Type Eucrite or howardite

### Physical Description:

This is not a complete specimen ( $\sim 3.5 \times 3.0 \times 1.5$  cm). Shiny, black fusion crust covers only one surface. The other surfaces are fracture surfaces which have a medium gray matrix with  $< 1$  mm white clasts. A few of these clasts are weathered and yellow in color. When this stone was cleaved in half, a dark gray clast ( $\sim 0.5$  cm) was exposed.

### Other Characteristics:

This meteorite looks very similar in appearance to ALHA78158.

### Petrographic Description: Brian Mason

Most of the section is an ophitic intergrowth of plagioclase-pigeonite breccia, with clasts up to 0.3 mm across. Fusion crust rims a considerable part of the section. Microprobe analyses of the ophitic portion shows pigeonite of fairly uniform composition, averaging  $Wo_{11}Fs_{53}En_{36}$ , with a little ferroaugite ( $Wo_{38}Fs_{32}En_{30}$ ), and plagioclase ranging  $An_{83-90}$ , average  $An_{86}$ . Pyroxene in the breccia is pigeonite ranging from  $Wo_8Fs_{37}En_{55}$  to  $Wo_8Fs_{61}En_{31}$ ; one grain of ferroaugite,  $Wo_{44}Fs_{29}En_{27}$ , was analyzed. The meteorite is a pyroxene-plagioclase achondrite; its classification as a howardite or a eucrite requires examination of the whole meteorite.